Curriculum Vitae: Venkatramani BALAJI

Contact information

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Degrees

Ph.D (Physics), Ohio State University.

M.Sc (Physics), Indian Institute of Technology, Kanpur.

Recent funded proposals

Department of Energy SciDAC grant DE-SC0006841: Parameterization Development at High Resolution in Atmospheric Models Utilizing Both Idealized and Realistic Model Configurations: 15 September 2011 - 14 September 2013, $1,020,867.

National Science Foundation: G8 Initiative: *ExArch*: "Climate analytics on distributed exascale data archives", 1 March 2011 - 31 May 2014, $312,967.

National Science Foundation, "CDI-Type II: Collaborative Research: Scaling up: Introducing commoditized governance into community Earth science modeling", 1 February 2010 - 31 January 2014, $204,415.

Siebel Energy Grand Challenge, Princeton University: "Accessible Climate Computing for Downstream Science", 2010: $40,000.

Department of Energy INCITE Renewal Award: "CHiMES: Coupled High-Resolution Modeling of the Earth System", 2010: 20,000,000 CPU-h.

NOAA Global Interoperability Program Award, Fund code 89, Program code 06-01-02-016, 2009-2010: $499,500.

NOAA HPCC Award WE-MAV-06, "Managing Petascale Earth System Model Outputs Exploring Server-side Mosaic Grid Transformations", 2009-2010: $120,000.

Department of Energy Petscale Early Access Award: "CHiMES: Coupled high-Resolution Modeling of the Earth System", 2009: 20,000,000 CPU-h.

Department of Energy INCITE Award: "CHiMES: Coupled high-Resolution Modeling of the Earth System", 2008-2009: 24,000,000 CPU-h.

Department of Energy Director's Discretionary Award: "CHiMES: Coupled high-Resolution Modeling of the Earth System", 2008-2009: 10,000,000 CPU-h.

Department of Energy Director's Discretionary Award: "CHiMES: Coupled high-Resolution Modeling of the Earth System", 2008: 8,000,000 CPU-h.

NASA Project Columbia Award: "Coupled Ocean and Atmosphere Data Assimilation System for Climate of the 20th Century", 2008: 1,200,000 CPU-hours.

Department of Energy Director's Discretionary Award: "CHiMES: Coupled high-Resolution Modeling of the Earth System", 2007: 2,500,000 CPU-h.

European Union Framework Programme FP7-INFRASTRUCTURES Grant 211753: “METAFOR: Common Metadata for Climate Modelling Digital Repositories”, 2007-2009: Co-Investigator funding for travel only.

NASA Project Columbia Award SMD-07-0442: “Coupled Ocean and Atmosphere Data Assimilation System for Climate of the 20th Century”, 2007: 400,000 CPU-hours.

NOAA IOOS/DMAC Award: “Linking Global and Regional IOOS Capabilities - An Oceans and Rivers to Coasts Demonstration”, 2006: $100,000.

NSF Award IIS-0513762: “Collaborative Research: Earth System Curator: Spanning the Gap Between Models and Datasets”, 2005-2008: $287,668.

NASA Award ESE-NN-H-04-Z-YS-008-N: “Development of Standard Implementation Practices and Productivity Software for ESMF-Based MAP Systems”, 2005-2008: $300,000.

NASA Project Columbia Award: “Modeling of entire hurricane season using high-resolution non-hydrostatic models”, 2006: 900,000 CPU-hours.

NASA Project Columbia Award: “Coupled Ocean and Atmosphere Data Assimilation System for Climate of the 20th Century”, 2005: 500,000 CPU-hours.

NASA Project Columbia Award: “Modeling of entire hurricane season using high-resolution non-hydrostatic models”, 2005: 500,000 CPU-hours.

NASA Project Columbia Award: “Coupled Ocean and Atmosphere Data Assimilation System for Climate of the 20th Century”, 2005: 200,000 CPU-hours.

NASA Award S-44-829-X: “Earth System Modeling Framework”, 2002-2005: $450,000.

Recent refereed publications

Balaji, V., 2012: Code parallelisation on massively parallel machines. *Earth System Modelling - Volume 2*, L. Bonaventura, R. Redler, and R. Budich, Eds., Springer Berlin Heidelberg, SpringerBriefs in Earth System Sciences, Vol. 1, 77–88.

Balaji, V., 2012: The Flexible Modeling System. *Earth System Modelling - Volume 3*, S. Valcke, R. Redler, and R. Budich, Eds., Springer Berlin Heidelberg, SpringerBriefs in Earth System Sciences, 33–41.

Balaji, V. and A. Langenhorst, 2012: ESM workflow. *Earth System Modelling - Volume 5*, R. Ford, G. Riley, R. Budich, and R. Redler, Eds., Springer Berlin Heidelberg, SpringerBriefs in Earth System Sciences, 5–13.

DeLuca, C., G. Theurich, and V. Balaji, 2012: The Earth System Modeling Framework. *Earth System Modelling - Volume 3*, Springer Berlin Heidelberg, SpringerBriefs in Earth System Sciences, 43–54.

Delworth, T. L., et al., 2011: Simulated climate and climate change in the GFDL CM2.5 high-resolution coupled climate model. *J. Climate*, in advance online publication.
`http://dx.doi.org/10.1175/JCLI-D-11-00316.1`.

Easterbrook, S., P. Edwards, V. Balaji, and R. Budich, 2011: Guest editors’ introduction: Climate change-science and software. *Software, IEEE*, **28 (6)**, 32–35.

Dunlap, R., Mark, L., Rugaber, S., Balaji, V., Chastang, J., Cinquini, L., DeLuca, C., Middleton, D., and Murphy, S. (2008): Earth system curator: metadata infrastructure for climate modeling. *Earth Science Informatics*, 1(3):131–149.

Shujia Zhou, V. Balaji, Carlos Cruz, Arlindo da Silva, Chris Hill, Erik Kluzek, Shep Smithline, Atanas Trayanov, Weiyu Yang, 2006: Cross-organization interoperability experiments of weather and climate models with the Earth System Modeling Framework. *Concurrency and Computation*, **19**, 583–592.

V. Balaji, Jeff Anderson, Isaac Held, Michael Winton, Jeff Durachta, Sergey Malyshev and Ronald J. Stouffer, 2006: "The Exchange Grid: a mechanism for data exchange between Earth System components on independent grids", *Parallel Computational Fluid Dynamics: Theory and Applications, Proceedings of the 2005 International Conference on Parallel Computational Fluid Dynamics*, Elsevier (2006).

Nancy Collins, Gerhard Theurich, Cecelia DeLuca, Max Suarez, Atanas Trayanov, V. Balaji, Peggy Li, Weiyu Yang, Chris Hill and Arlindo da Silva, 2005: Design and Implementation of Components in the Earth System Modeling Framework. *International Journal of HPC Applications*, **19**, 341–350.

Gnanadesikan *et al* 2005: GFDL's CM2 global coupled climate models, Part 2. The baseline ocean simulation. *J. Clim.*, **19**, p. 675–697.

Delworth *et al* 2005: GFDL's CM2 global coupled climate models, Part 1. Formulation and simulation characteristics. *J. Clim.*, **19**, p. 643–674..

GFDL Global Atmospheric Model Development Team, 2004: The new GFDL global atmosphere and land model AM2-LM2: Evaluation with prescribed SST simulations. *J. Clim*., 17(24), 4641–4673

Zhang, S., M. J. Harrison, A. Wittenberg, A. Rosati, J. L. Anderson and V. Balaji, 2005: Initialization of an ENSO Forecast System using a Parallelized Ensemble Filter. *Mon. Wea. Rev.*, **133**, 3176–3201.

Other publications

Balaji, 2009: "Pervasive Fault Tolerance", in *Scientific Grand Challenges in Fusion Energy Sciences and the Role of Computing at the Extreme Scale*, DOE/ASCR Workshop Report.

Dean Williams et al, 2009: "Extreme Scale Data Management, Analysis, Visualization, and Productivity in Climate Change Science", in *Extreme Scale Data Management, Analysis, Visualization, and Productivity in Climate Change Science*, DOE/ASCR Workshop Report.

V. Balaji and Robert Numrich, 2005: "A Uniform Memory Model for Distributed Data Objects on Parallel Architectures", *Use of High-Performance Computing in Meteorology*, Proceedings of the XIth ECMWF Workshop, pp. 272–294.

"The FMS Manual, a design, implementation and use guide to the Flexible Modeling System.", 2005.

Recent invited talks

IS-ENES Workshop on Dynamical Cores for Climate Models, Lecce, Italy, 15 December 2011: "The Flexible Modeling System and the Finite-Volume Cubed-Sphere Dycore".

American Geophysical Union, 8 December 2011: "Climate analytics on exascale data archives".

City University of New York, 26 September 2011: "Defensive programming in the million-core era".

Computer Society of India, 29 August 2011: "The Role of Computing in Advancing Climate Change Science".

Indian Institute of Technology, Kanpur, 23 August 2011: “Climate Computing”.

Abdus-Salam International Centre for Theoretical Physics, Trieste, 17 May 2011: “The ExArch Project”.

Abdus-Salam International Centre for Theoretical Physics, Trieste, 16 May 2011: “Earth System Grid Federation: Global e-Infrastructure for climate science”.

SC10, New Orleans, 17 November 2010, *Climate Masterworks* talk: “Climate Computing: Computational, Data, and Scientific Scalability”.

HPCS2010, Toronto, 7 June 2010, Keynote Address, “HPC in Climate Modeling.”

Metafor Year 2 Meeting, Paris, 9 February 2010: “ESC, GIP, COG, and other TLAs”.

Global Interoperability Program Kickoff Meeting, Princeton, 5 November 2009: “CMIP5 and Multi-Model Ensembles for Climate Research”.

9th GO-ESSP Meeting, Max-Planck Institüt, Hamburg, Germany, 8 October 2009: “Curator Commodity Governance”.

9th GO-ESSP Meeting, Max-Planck Institüt, Hamburg, Germany, 6 October 2009: “Grids Theme Overview”.

NCDC-GFDL Workshop on Effective Access to Integrated Model Output and Observations, Princeton, 18 Auguest 2009: “Data Availability for AR4 and AR5”.

DEISA/XSEDE Workshop, Pittsburgh Supercomputing Center, 28 July 2009: “Climate Science on Computational and Data Grids”.

International Supercomputing Conference (ISC) 2009, Hamburg, 23 June 2009: “Climate Computing: Computational, Data, and Scientific Scalability”.

GFDL Review, Princeton, 15 May 2009: “Modeling Services”.

National Marine Fisheries Service Visit, Princeton, 25 March 2009: “Data Availability for AR4 and AR5”.

DOE-ASCR Exascale Fusion Workshop, Gaithersburg MD, 19 March 2009: “Defensive Programming in the million-core era”.

Visit of EU Research Commissioner Silva Rodriguez, Princeton University, 9 February 2009: “Modeling Frameworks and Data Frameworks”.

OMB and DOC Visit to NOAA/GFDL, 9 January 2009: “Climate Modeling: A National and Global Enterprise”.

OMB and DOC Visit to NOAA/GFDL, 9 January 2009: “High-Resolution Modeling of the Climate System”.

AR5 Science Workshop, NASA/GISS, New York, 19 November 2008: “Curator, Metafor and CMIP5”.

WGNE-24, Montreal, 4 November 2008: “Plans and results from the NOAA Climate Modeling Program”.

NASA Earth System Data Systems Working Group, Philadelphia, 23 October 2008: “The CF Conventions”.

Fall Creek Petascale Workshop, Tennessee, 8 September 2008: “CHiMES: Coupled High-Resolution Modeling of the Earth System”.

World Modeling Summit, Reading UK, 8 May 2008: “Making the heroic routine”.

UN Year of Planet Earth, Seoul, South Korea, **Keynote Address**, 23 April 2008: “Modeling Frameworks and Data Frameworks”.

Korean Meteorological Agency, Seoul, South Korea, 22 April 2008: “Frameworks for Climate Modeling”.

South African Science and Technology Delegation Meeting, Washington, 28 February 2008: “A Climate Model for Africa?”

Department of Energy, 20 July 2007: “CHiMES: Coupled high-Resolution Modeling of the Earth System.”

GO-ESSP Meeting, 11 June 2007: “IPCC-AR5 use cases”.

ESMF Community meeting, 30 May 2007: “Curators as a natural outgrowth of frameworks”.

NCAR-GFDL Atmospheric Modeling Workshop, 8 May 2007: “Exchange Grids”.

NOAA Unified Modeling Infrastructure Team, 16 Feb 2007: “FMS Coupling Architecture”.

Unidata Workshop on Community Standards for Unstructured Grids, Boulder CO, 17-18 October 2006: “Grids, meshes and mosaics.”

CRRC Fall Institute on Innovative Coastal Modeling for Decision Support: Integrating Physical, Biological, and Toxicological Models, Durham NH, 26-28 September 2006: “Frameworks for Climate Modeling”.

MODEST-7c Astrophysics Workshop on Multi-scale, Multi-physics Software Frameworks, Philadelphia PA, 15 September 2006: “Frameworks for Climate Modeling”.

PetaScale Computation for the Geosciences Workshop, San Diego, 4-5 April 2006: “ Climate Modeling at GFDL: Challenges for the Next Cycle”.

Keynote Speech, Coastal Inundation Workshop, Jacksonville, 14 February 2006: “Introduction to the Earth System Modeling Framework”.

Keynote Speech, PRISM Workshop, Toulouse, 16 November 2005: “Convergence of model frameworks and data frameworks.”

PRISM Workshop, Toulouse, 16 November 2005: “ Standard representation of grids used in Earth system modeling.”

CAS2K5, Annecy, France, 14 September 2005: “Earth System Curator: Integration technology for Earth system models and data”.

ESMF Community Meeting, Cambridge, 21 July 2005: “Earth System Curator: Integration technology for Earth system models and data”.

Recent workshops organized

Global Interoperability Program (GIP) Kickoff Meeting, Princeton, 5-6 November 2009.

GO-ESSP Community Workshop, Hamburg, 6-8 October 2009.

Chair, AGU Oral Session IN21B, San Francisco, 16 December 2008: “The Science of Coupling With the Earth System Modeling Framework”.

GO-ESSP Community Workshop, Seattle 17-19 September 2008.

Second Earth System Curator Workshop, Princeton, 18-19 October 2007.

GO-ESSP Community Workshop, Paris, France, 11-13 June 2007.

Ocean Model Coupling Workshop, Princeton, 7 February 2007.

First Earth System Curator Workshop, Princeton, 27-28 September 2006.

GO-ESSP Community Workshop, Livermore, CA, 19-21 June 2006.

PRISM/ESMF Metadata Meeting, Exeter UK, 9-11 May 2006.

Lectures and teaching

ACCESS Climate Modeling Workshop, Cape Town, South Africa: 10-20 March 2008.

PICASSO Parallel Programming Workshop, Princeton University, 2-3 March 2004: lecture and tutorial on parallel programming models.

NASA HPC Summer School 2004, Greenbelt MD, 23 July 2004: "Climate model design."

Indian Ocean Modeling Workshop, Bangalore, October 2004: Lectures and tutorials on parallel computing, parallel algorithm design, Flexible Modeling System (FMS), FMS Runtime Environment (FRE).

Professional activities, committees, peer review, etc

Head, Modeling Systems Group, GFDL Princeton University.

Member, GFDL Research Council.

Member, National Research Council Panel: "A National Strategy for Advancing Climate Modeling". **`http://www8.nationalacademies.org/cp/projectview.aspx?key=49288`**

Member, Science Advisory Board, Oak Ridge Climate Change Science Institute, 2010-2013.

World Climate Research Program representative to the Advisory Board of the Climate Code Foundation, 2011-2015.

Leader, Modeling Infrastructure Team, GFDL Princeton University.

Co-Chair, Data Portal Development Team, GFDL Princeton University.

Member, NOAA Unified Modeling Infrastructure Development Team.

Member, National Unified Operational Prediction Center (NUOPC) Common Modeling Architecture Committee.

Member, IOOS/DMAC (Ocean.US) Modeling Caucus.

Technical Lead, Earth System Modeling Framework (ESMF) development team, 2002-2005.

Member, Executive Committee, ESMF.

Chair, Joint Specification Committee, ESMF.

Member, Scientific Steering Committee, Program for Integrated Earth System Modeling (PRISM) Project, Europe, 2001-2005.

Member, WGCM Committee on Climate and Forecasting (CF) Conventions, 2006-2010.

Member, Steering Committee, Global Organization of Earth System Science Portals (GO-ESSP).

Lead, e-Science Steering Committee, Asia-Pacific Advanced Network (APAN) Consortium, 2005-2006.

(2009) Reviewed grant applications for NSF, NASA, DOE, NERC (UK).

(2009) Sat on Major Center Review Panels for DOE and NSF.

Reviewed papers for *IBM Journal of Research and Development*, *Journal of the Atmospheric Sciences*, *International Journal of HPC Applications*, *Earth Science Informatics* and *Environmental Modeling and Software*.

Princeton, New Jersey, 8 March 2012